

1 CLAIMS

2  
3 *Sub*  
4 *Claim*  
5 1. A computing device comprising:  
6 one or more processors;  
7 memory operably associated with the one or more processors; and  
8 a context service module loadable in the memory and executable by the one  
9 or more processors to receive context information from one or more context  
10 providers and process the information to determine a current device context.  
11

12 2. The computing device of claim 1 embodied as a mobile computing  
13 device.  
14

15 3. The computing device of claim 1 embodied as a desktop computing  
16 device.  
17

18 4. The computing device of claim 1, wherein the device comprises  
19 cache memory that maintains a current device context.  
20

21 5. The computing device of claim 1, wherein the context service module  
22 is configured to automatically receive the context information from the context  
23 providers.  
24  
25

1       6.     The computing device of claim 1, wherein the context service module  
2 is configured to automatically receive the context information from the context  
3 providers and, as the context of the computing device changes, process the  
4 information to determine a new current device context.

5  
6       7.     The computing device of claim 1, wherein the context service module  
7 is configured to request context information from one or more of the context  
8 providers.

9  
10       8.    The computing device of claim 1, wherein the context service module  
11 is configured to provide information concerning a current device context to one or  
12 more applications.

13  
14       9.    The computing device of claim 8, wherein the context service module  
15 is configured to receive a request from the one or more applications that request  
16 the current device context information.

17  
18       10.   The computing device of claim 1 further comprising a context  
19 provider interface associated with the context service module, the context provider  
20 interface comprising a common interface that is capable is receiving context  
21 information from multiple different context providers.

1           11. The computing device of claim 1 further comprising one or more  
2 application program interfaces (APIs) operably associated with the context service  
3 module, the one or more APIs being callable by one or more applications to  
4 acquire information concerning the current device context.

5  
6           12. The computing device of claim 1 further comprising one or more  
7 events that are configured for use by one or more applications so that the  
8 applications can register to receive information concerning a current device  
9 context responsive to the occurrence of one or more events.

10  
11           13. A computing device comprising:  
12 one or more processors;  
13 memory operably associated with the one or more processors; and  
14 a location service module loadable in the memory and executable by the  
15 one or more processors to receive location information from one or more location  
16 providers and process the information to determine a current device location.

17  
18           14. The computing device of claim 13 embodied as a mobile computing  
19 device.

20  
21           15. The computing device of claim 13 embodied as a desktop  
22 computing device.

1       **16.**    The computing device of claim 13, wherein the location service  
2 module is configured to automatically receive the location information from the  
3 location providers.

4  
5       **17.**    The computing device of claim 13, wherein the location service  
6 module is configured to automatically receive the location information from the  
7 location providers and, as the location of the computing device changes, process  
8 the information to determine a new current device location.

9  
10       **18.**   The computing device of claim 13, wherein the location service  
11 module is configured to request location information from one or more of the  
12 location providers.

13  
14       **19.**   The computing device of claim 13, wherein the location service  
15 module is configured to provide information concerning a current device location  
16 to one or more applications.

17  
18       **20.**   The computing device of claim 13, further comprising a location  
19 provider interface associated with the location service module, the location  
20 provider interface comprising a common interface that is capable is receiving  
21 location information from multiple different location providers.

1           **21.**    The computing device of claim 13, further comprising one or more  
2 application program interfaces (APIs) operably associated with the location  
3 service module, the one or more APIs being callable by one or more applications  
4 to acquire information concerning the current device location.

5  
6           **22.**    The computing device of claim 13, further comprising one or more  
7 events that are configured for use by one or more applications so that the  
8 applications can register to receive information concerning a current device  
9 location responsive to the occurrence of one or more events.

10  
11           **23.**    A computing device comprising:  
12           one or more processors;  
13           one or more computer-readable media;  
14           at least one hierarchical tree structure resident on the media and comprising  
15 multiple nodes each of which represents a geographical division of the Earth; and  
16           a location service module loadable in the memory and executable by the  
17 one or more processors to receive location information from one or more location  
18 providers and process the information to determine a current device location that  
19 comprises a node of the hierarchical tree structure.

20  
21           **24.**    The computing device of claim 23 embodied as a mobile computing  
22 device.

1       **25.**   The computing device of claim 23 embodied as a desktop  
2 computing device.

3  
4       **26.**   The computing device of claim 23, wherein the location service  
5 module is configured to determine the current device location by traversing  
6 multiple nodes of the hierarchical tree.

7  
8       **27.**   The computing device of claim 23 further comprising another  
9 hierarchical tree structure resident on the media and comprising multiple nodes  
10 each of which represents a physical or logical entity, the location service module  
11 being configured to determine the current device location by traversing multiple  
12 nodes of the hierarchical trees.

13  
14       **28.**   The computing device of claim 23 further comprising:  
15 another hierarchical tree structure resident on the media and comprising  
16 multiple nodes each of which represents a physical and/or logical entity; and  
17 a link between nodes on the different trees,  
18 the location service module being configured to determine the current  
19 device location by traversing multiple nodes of the hierarchical trees.

20  
21       **29.**   The computing device of claim 23, wherein the location service  
22 module is configured to provide information concerning a current device location  
23 to one or more applications for rendering location-specific services.

1       **30.**    The computing device of claim 29, wherein the location service  
2 module is configured to receive calls from the one or more applications that  
3 request the information concerning the current device location.

4  
5       **31.**    The computing device of claim 29, wherein the location service  
6 module is configured to register one or more applications for notification of  
7 information concerning a current device location upon the occurrence of a  
8 definable event.

9  
10       **32.**    A computing device comprising:  
11       one or more processors;  
12       one or more computer-readable media;  
13       at least one hierarchical tree structure resident on the media and comprising  
14 multiple nodes each of which represents a physical or logical entity; and  
15       a location service module loadable in the memory and executable by the  
16 one or more processors to receive location information from one or more location  
17 providers and process the information to determine a current device location that  
18 comprises a node of the hierarchical tree structure.

19  
20       **33.**    The device of claim 32 embodied as a mobile computing device.

21  
22       **34.**    The device of claim 32 embodied as a desktop computing device.

1        35.    The device of claim 32, wherein the hierarchical tree structure  
2 comprises an organization specific tree structure that has context only within a  
3 particular organization.  
4

5        36.    The device of claim 32 further comprising one or more services  
6 associated with one or more nodes of the hierarchical tree, the device comprising  
7 an application that is executing on the one or more processors to traverse the  
8 hierarchical tree to located the one or more service.  
9

10       37.    A location-aware computing system comprising:  
11 one or more computing devices;  
12 each computing device having a software architecture comprising:  
13        a location provider interface that is configured to receive location  
14 information;  
15        a location service module communicatively associated with the  
16 location provider interface and configured to receive the location  
17 information from the multiple different location providers and process the  
18 information to ascertain a current device location; and  
19        one or more application program interfaces (API) or events  
20 associated with the location service module and defining a mechanism  
21 through which information concerning a current device location can be  
22 provided to one or more applications that are configured to provide  
23 location-specific services.  
24  
25



1           **38.**    The location-aware computing system of claim 37, wherein at least  
2 one of the one or more computing devices comprises a mobile computing device.

3  
4           **39.**    The location-aware computing system of claim 37, wherein at least  
5 one of the one or more computing devices comprises a desktop computing device.

6  
7           **40.**    The location-aware computing system of claim 37, wherein the  
8 location provider interface is configured to receive location information from  
9 multiple different location providers.

10  
11          **41.**    The location-aware computing system of claim 37, wherein the  
12 location provider interface is configured to receive location information from  
13 multiple different location providers, the location service module being configured  
14 to poll one or more of the location providers so that the polled location provider  
15 can provide location information to the location provider interface.

16  
17          **42.**    The location-aware computing system of claim 37 further  
18 comprising:

19           one or more computer-readable media; and

20           a hierarchical tree structure resident on the media and comprising multiple  
21 nodes each of which represent geographical divisional of the Earth, the location  
22 service module being configured to process the information to ascertain a current  
23 device location that comprises one node on the hierarchical tree structure.

1           **43.**   The location-aware computing system of claim 42, wherein the  
2 location service module is configured to ascertain a current device location by  
3 traversing the hierarchical tree structure to a root of the tree structure.

4  
5           **44.**   The location-aware computing system of claim 42 further  
6 comprising one or more additional hierarchical tree structures resident on the  
7 media and comprising multiple nodes each of which represent physical or logical  
8 entities, the additional hierarchical trees each having at least one node that is  
9 linked with the first-mentioned hierarchical tree structure, the location service  
10 module being configured to ascertain a current device location by traversing at  
11 least one of the additional hierarchical trees and the first-mentioned hierarchical  
12 tree.

13  
14           **45.**   A computer-implemented method of determining a computing  
15 device context comprising:

16           receiving, with a computing device, information that pertains to a current  
17 context of the device;

18           processing the information on and with the device to ascertain the current  
19 context of the computing device.

20  
21           **46.**   The computer-implemented method of claim 45, wherein said  
22 receiving comprises receiving the information with a mobile computing device.

1       **47.**   The computer-implemented method of claim 45, wherein said  
2 receiving comprises receiving the information with a hand-held computing device.

3  
4       **48.**   The computer-implemented method of claim 45, wherein said  
5 receiving comprises receiving the information with a desktop computing device.

6  
7       **49.**   The computer-implemented method of claim 45, wherein the current  
8 context is the device location.

9  
10       **50.**   The computer-implemented method of claim 49, wherein the  
11 receiving of the information comprise receiving information from multiple  
12 different location providers.

13  
14       **51.**   The computer-implemented method of claim 50, wherein the  
15 information that is received from the multiple different location providers is  
16 received in different forms.

17  
18       **52.**   The computer-implemented method of claim 50, wherein the  
19 receiving of the information comprises receiving the information through a  
20 common interface.

21  
22       **53.**   The computer-implemented method of claim 45, wherein the  
23 receiving of the information comprise receiving information from multiple  
24 different context providers.  
25

1       **54.**   The computer-implemented method of claim 53, wherein the  
2 information that is received from the multiple different location providers is  
3 received in different forms.

4  
5       **55.**   The computer-implemented method of claim 53, wherein the  
6 receiving of the information comprises receiving the information through a  
7 common interface.

8  
9       **56.**   The computer-implemented method of claim 45 further comprising  
10 receiving a request from an application for information that pertains to the current  
11 context of the mobile computing device and returning at least some information to  
12 the application.

13  
14       **57.**   The computer-implemented method of claim 45 further comprising  
15 receiving at least one event registration from one or more applications that pertains  
16 to an event for which the application is to receive information pertaining to the  
17 current context of the computing device, and returning information pertaining to  
18 the current context of the computing device to the one or more applications  
19 responsive to the occurrence of an event.

20  
21       **58.**   One of more computer-readable media having computer-readable  
22 instructions thereon which, when executed by a computing device, cause the  
23 computing device to:

24       receive information that pertains to a current location of the device, the  
25 information being received from multiple different location providers; and

1 process the information to map the information to a node of a hierarchical  
2 tree structure that comprises multiple nodes that represent either (1) geographical  
3 divisions of the Earth or (2) physical or logical entities; and

4 traverse the hierarchical tree structure to ascertain the current device  
5 location.

6  
7 **59.** A computer-implemented method of determining the location of a  
8 hand-held, mobile computing device comprising:

9 maintaining a hierarchical tree structure on the mobile computing device,  
10 the tree structure comprising multiple nodes each of which represent geographical  
11 divisions of the Earth;

12 receiving information from multiple different location providers that  
13 describe aspects of a current device location;

14 processing the information with the mobile device to ascertain a node on  
15 the tree structure that likely constitutes a current device location; and

16 traversing at least one other node of the tree structure to ascertain additional  
17 location information that is associated with the current device location.

18  
19 **60.** The computer-implemented method of claim 59, wherein:

20 the maintaining of the hierarchical tree structure comprises maintaining  
21 multiple hierarchical tree structures that are linked with one another; and

22 the traversing comprises traversing the multiple hierarchical tree structures  
23 to ascertain the additional location information.

1           **61.**    The computer-implemented method of claim 60, wherein one tree  
2 structure comprises a unique representation of a physical or logical entity.

3  
4           **62.**    The computer-implemented method of claim 59 further comprising  
5 receiving a request from one or more applications for information that pertains to a  
6 current device location and providing the one or more applications with the  
7 information that pertains to the current device location.

8  
9           **63.**    The computer-implemented method of claim 62, wherein the  
10 receiving of the request comprises receiving a call to an application program  
11 interface (API).

12  
13           **64.**    The computer-implemented method of claim 62, wherein the  
14 receiving of the request comprises receiving an event registration.

15  
16           **65.**    The computer-implemented method of claim 62 further comprising  
17 applying a security policy to the information that pertains to the current device  
18 location before providing the information to the one or more applications.

19  
20           **66.**    The computer-implemented method of claim 59 further comprising  
21 before processing the information to ascertain a node, resolving any conflicts that  
22 might exist between information that is received from different location providers.

1        67.    One or more computer-readable media having computer-readable  
2 instructions thereon which, when executed by a computing device, cause the  
3 computing device to:

4            maintain or access a hierarchical tree structure on or with the computing  
5 device, the tree structure comprising multiple nodes each of which represent  
6 geographical divisions of the Earth;

7            receive information from multiple different location providers that describe  
8 aspects of a current device location;

9            process the information with the device to ascertain a node on the tree  
10 structure that likely constitutes a current device location;

11            traverse at least one other node of the tree structure to ascertain additional  
12 location information that is associated with the current device location;

13            receive one or more calls from one or more applications for information  
14 that pertains to a current device location, the applications being configured to  
15 render location-specific information; and

16            supply at least some information that pertains to the current device location  
17 to the one or more applications.